

## REMARKS

By this amendment, the abstract and claims 1, 3, 4 and 11 have been amended. Claims 1-14 remain in the application. Support for the amendments to the claims can be found the specification and drawings. No new matter has been added. Reconsideration, withdrawal of the final action, and allowance of the application, as amended, is respectfully requested.

### **Specification**

The abstract of the disclosure stands objected to as not containing proper content of an abstract of the disclosure. By this amendment, the abstract has been amended to not refer to purported merits of the invention. Accordingly, the objection to the specification has been overcome and should be withdrawn.

### **Rejection under 35 U.S.C. §103**

Claim 1 recites a method for measuring a switched current which is periodically switched on and off with use of a switch, and providing a measuring signal accurately reflecting said switched current, the method comprising:

sensing said switched current with a current sensor to obtain an intermediate measuring signal corresponding to an AC part of said switched current, wherein the current sensor includes an AC current transformer having a primary winding coupled in series with the switch, the AC current transformer further having a secondary winding for providing the intermediate measuring signal;

receiving a timing signal indicating the on and off periods of the switched current;

during an off period of the switch, generating an auxiliary signal such that the sum of (i) said intermediate measuring signal during the off period and (ii) said auxiliary signal generated during the off period is equal to zero; and

      during an on period of the switch, summing (i) said intermediate measuring signal during the on period and (ii) said auxiliary signal that was generated during the off period; and

      providing the sum signal from the off period and from the on period as the measuring signal of the switched current, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current.

Support for the amendments to claim 1 (as well as for amendments to claim 3), can be found in the specification at least on page 3, lines 32-33; page 4, lines 5-9 and 31-33; and page 5, lines 1-2 and 22-29.

Claims 1-4, 7-11, 13 and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Lethellier** (USPAT 6,441,597) in view of **Schetelig et al.** (USPAT 6,895,229) and in further view of **Neft** (USPAT 4,896,242).

### Claims 1-3

With respect to claim 1, Applicant respectfully traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 1.

As the PTO recognizes in MPEP § 2142:

*... The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness...*

It is submitted that, in the present case, the examiner has not factually supported a *prima facie* case of obviousness for at least the following, mutually exclusive, reasons.

**1. Even When Combined, the References Do Not Teach the Claimed Subject Matter**

The **Lethellier, Schetelig** and **Neft** references cannot be applied to reject claim 1 under 35 U.S.C. § 103 which provides that:

*A patent may not be obtained ... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains ... (Emphasis added)*

Thus, when evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, since neither **Lethellier** nor **Schetelig** nor **Neft** teaches "during an off period of the switch, generating *an auxiliary signal* such that the *sum of* (i) *said intermediate measuring signal* and (ii) *said auxiliary signal* is *equal to zero* ... and ... during an on period of the switch, summing (i) *said intermediate measuring signal during the on period* and (ii) *said auxiliary signal that was generated during the off period ... and ... providing the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current*" [emphasis added] as is specifically claimed in claim 1, it is impossible to render the subject matter of claim 1 as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

In contrast, **Lethellier** discloses a method and apparatus for sensing output inductor current in a DC-to-DC converter in which a current sensor coupled to an output inductor comprises a capacitor and a resistance. The voltage measured across the capacitor provides a current sense signal corresponding to the output current passing through the output inductor. In addition, a pulse width modulation circuit controls a power switch of the DC-to-DC converter in response to the current sense signal. (See **Lethellier** at Col. 3, lines 41-46 and 55-67). However, **Lethellier** does not teach or suggest "during an off period of the switch, generating *an auxiliary signal* such that the *sum* of (i) said intermediate measuring signal and (ii) said auxiliary signal is *equal to zero* ... **and** ... during an on period of the switch, *summing* (i) said intermediate measuring signal *during the on period* and (ii) said auxiliary signal *that was generated during the off period* ..." as is specifically claimed in claim 1. Neither does **Lethellier** teach or suggest "... *providing the sum signal from the off period and from the on period* as the *measuring signal*, the *measuring signal reflecting* an actual value of the *AC part and a DC part* of the switched current" as is also specifically claimed in claim 1.

Additionally, in contrast, **Schetelig** discloses a receiver arrangement for receiving frequency-modulated radio signals and methods for adapting and testing a receiving branch of the receiver arrangement. In the receiver arrangement, an offset stage 21 serves as an output stage of a demodulator circuit arrangement 18 and is coupled to an A/D converter 22, which serves as the input stage of a signal-processing circuit arrangement 23. (See **Schetelig** at Col. 5, lines 17-20). However, **Schetelig** does not teach or suggest "during an off period of the switch, generating *an auxiliary signal* such that the *sum* of (i) said intermediate measuring signal and (ii) said auxiliary signal is *equal to zero* ... **and** ... during an on period of the switch, *summing* (i) said intermediate measuring signal *during the on period* and (ii) said auxiliary signal *that was generated during the off period* ..." as is specifically claimed in claim 1. Neither does **Schetelig** teach or suggest "... *providing the sum signal from the off period and*

from the *on* period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current" as is also specifically claimed in claim 1.

Furthermore, in contrast, **Neft** discloses a direct AC-DC converter fault protection system. In one embodiment of **Neft**, a single current sensor is coupled with several input lines of one group and another sensor is coupled with the common output line of the group. Any fault current in the group is detected by comparison between the sensed signal of the common bilateral switch current sensor and the sensed signal of the associated output line current sensor. In addition, upon detection of a fault, there is a command to turn the switches OFF reliably and safely. (See **Neft** at Col. 1, lines 50-56, and Col. 3, lines 18-20). However, **Neft** does not teach or suggest "during an off period of the switch, generating *an auxiliary signal* such that the *sum* of (i) said intermediate measuring signal and (ii) said auxiliary signal is *equal to zero ... and ... during an on period* of the switch, summing (i) said intermediate measuring signal ***during the on period*** and (ii) said auxiliary signal *that was generated during the off period ...*" as is specifically claimed in claim 1. Neither does **Neft** teach or suggest "... *providing the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current*" as is also specifically claimed in claim 1.

## 2. The Combination of References is Improper

Assuming, arguendo, that none of the above arguments for non-obviousness apply (which is clearly not the case based on the above), there is still another, mutually exclusive, and compelling reason why **Lethellier**, **Schotelig**, and **Neft** cannot be applied to reject claim 1 under 35 U.S.C. § 103.

§ 2142 of the MPEP also provides:

*...the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made.....The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.*

Here, neither **Lethellier, Schetelig** nor **Neft** teaches, or even suggests, the desirability of the combination since neither teaches the specific steps that include "during an off period of the switch, generating an auxiliary signal such that the sum of (i) said intermediate measuring signal and (ii) said auxiliary signal is equal to zero ... and ... during an on period of the switch, summing (i) said intermediate measuring signal during the on period and (ii) said auxiliary signal that was generated during the off period ... and ... providing the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current" as specified above and as claimed in claim 1.

Thus, it is clear that neither patent provides any incentive or motivation supporting the desirability of the combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. § 103 rejection.

In this context, the MPEP further provides at § 2143.01:

*The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.*

In the above context, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination.

In the present case it is clear that the examiner's combination arises solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in either reference for the combination as applied to claim 1. Therefore, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

Accordingly, claim 1 is allowable and an early formal notice thereof is requested. Dependent claim 2 depends from and further limits independent claim 1 and therefore is allowable as well. The 35 U.S.C. § 103(a) rejection thereof has now been overcome.

By this amendment, claim 3 has been amended in a similar manner as with respect to the amendments to claim 1. Accordingly, claim 3 is believed allowable for at least the same reasons as those presented herein above with respect to overcoming the rejection of claim 1. The 35 U.S.C. § 103(a) rejection thereof has now been overcome.

#### **Claims 4, 7-11, 13 and 14**

Claim 4 recites a switch current measuring circuit for measuring a current in a switch and providing a measuring signal accurately reflecting said current, the circuit comprising:

a current sensing stage for providing an intermediate measuring signal corresponding to an AC part of said current; and

an offset stage for adding an offset to the intermediate measuring signal, wherein the current sensing stage includes a current sensor coupled in series with the switch, and wherein the offset stage is configured to receive a timing signal indicating the on and off periods of the switched current, wherein during an

off period of the switch, the offset stage is further configured to generate an auxiliary signal such that the sum of (i) the intermediate measuring signal during the off period and (ii) the auxiliary signal generated during the off period is equal to zero, wherein during an on period of the switch, the offset stage is further configured to sum (i) the intermediate measuring signal during the on period and (ii) the auxiliary signal that was generated during the off period, and to provide the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current.

Support for the amendments to claim 4 (as well as for amendments to claim 11), can be found in the specification at least on page 3, lines 32-33; page 4, lines 5-9 and 31-33; and page 5, lines 1-2 and 22-29.

With respect to claim 4, Applicant respectfully traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 4.

As the PTO recognizes in MPEP § 2142:

*... The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness...*

It is submitted that, in the present case, the examiner has not factually supported a *prima facie* case of obviousness for at least the following, mutually exclusive, reasons.

**3. Even When Combined, the References Do Not Teach the Claimed Subject Matter**

The **Lethellier, Schetelig and Neft** references cannot be applied to reject claim 4 under 35 U.S.C. § 103 which provides that:

*A patent may not be obtained ... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains ... (Emphasis added)*

Thus, when evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, since neither **Lethellier** nor **Schetelig** nor **Neft** teaches an "offset stage ... configured to receive a *timing signal* indicating the on and off periods of the switched current, wherein during an off period of the switch, the offset stage is ... configured to generate an auxiliary signal such that the *sum* of (i) the intermediate measuring signal during the off period and (ii) the auxiliary signal generated during the off period is equal to zero [... and ...] wherein during an on period of the switch, the offset stage is ... configured to sum (i) the intermediate measuring signal during the on period and (ii) the auxiliary signal *that was generated during the off period* ... and ... provide the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current" [emphasis added] as is specifically claimed in claim 4, it is impossible to render the subject matter of claim 4 as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

In contrast, **Lethellier** discloses a method and apparatus for sensing output inductor current in a DC-to-DC converter in which a current sensor coupled to an output inductor comprises a capacitor and a resistance. The voltage measured across the

capacitor provides a current sense signal corresponding to the output current passing through the output inductor. In addition, a pulse width modulation circuit controls a power switch of the DC-to-DC converter in response to the current sense signal. (See **Lethellier** at Col. 3, lines 41-46 and 55-67). However, **Lethellier** does not teach or suggest an "offset stage ... configured to receive a *timing signal* indicating the on and off periods of the switched current, wherein during an off period of the switch, the offset stage is ... configured to generate an auxiliary signal such that the *sum* of (i) the intermediate measuring signal during the off period and (ii) the auxiliary signal generated during the off period is equal to zero [ ... and ... ] wherein during an on period of the switch, the offset stage is ... configured to sum (i) the intermediate measuring signal during the on period and (ii) the auxiliary signal *that was generated during the off period* ..." as is specifically claimed in claim 4. Neither does **Lethellier** teach or suggest an "offset stage ... configured to ... provide the *sum signal from the off period and from the on period* as the *measuring signal*, the *measuring signal reflecting an actual value of the AC part and a DC part of the switched current*" as is also specifically claimed in claim 4.

Additionally, in contrast, **Schetelig** discloses a receiver arrangement for receiving frequency-modulated radio signals and methods for adapting and testing a receiving branch of the receiver arrangement. In the receiver arrangement, an offset stage 21 serves as an output stage of a demodulator circuit arrangement 18 and is coupled to an A/D converter 22, which serves as the input stage of a signal-processing circuit arrangement 23. (See **Schetelig** at Col. 5, lines 17-20). However, **Schetelig** does not teach or suggest an "offset stage ... configured to receive a *timing signal* indicating the on and off periods of the switched current, wherein during an off period of the switch, the offset stage is ... configured to generate an auxiliary signal such that the *sum* of (i) the intermediate measuring signal during the off period and (ii) the auxiliary signal generated during the off period is equal to zero [ ... and ... ] wherein during an

on period of the switch, the offset stage is ... configured to sum (i) the intermediate measuring signal during the on period and (ii) the auxiliary signal *that was generated during the off period* ..." as is specifically claimed in claim 4. Neither does **Schotelig** teach or suggest an "offset stage ... configured to ... provide the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current" as is also specifically claimed in claim 4.

Furthermore, in contrast, **Neft** discloses a direct AC-DC converter fault protection system. In one embodiment of **Neft**, a single current sensor is coupled with several input lines of one group and another sensor is coupled with the common output line of the group. Any fault current in the group is detected by comparison between the sensed signal of the common bilateral switch current sensor and the sensed signal of the associated output line current sensor. In addition, upon detection of a fault, there is a command to turn the switches OFF reliably and safely. (See **Neft** at Col. 1, lines 50-56, and Col. 3, lines 18-20). However, **Neft** does not teach or suggest an "offset stage ... configured to receive a *timing signal* indicating the on and off periods of the switched current, wherein during an off period of the switch, the offset stage is ... configured to generate an auxiliary signal such that the sum of (i) the intermediate measuring signal during the off period and (ii) the auxiliary signal generated during the off period is equal to zero [ ... and ... ] wherein during an on period of the switch, the offset stage is ... configured to sum (i) the intermediate measuring signal during the on period and (ii) the auxiliary signal *that was generated during the off period* ..." as is specifically claimed in claim 4. Neither does **Neft** teach or suggest an "offset stage ... configured to ... provide the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current" as is also specifically claimed in claim 4.

#### 4. The Combination of References is Improper

Assuming, arguendo, that none of the above arguments for non-obviousness apply (which is clearly not the case based on the above), there is still another, mutually exclusive, and compelling reason why **Lethellier**, **Schetelig**, and **Neft** cannot be applied to reject claim 4 under 35 U.S.C. § 103.

§ 2142 of the MPEP also provides:

*...the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made.....The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.*

Here, neither **Lethellier**, **Schetelig** nor **Neft** teaches, or even suggests, the desirability of the combination since neither teaches the specific "offset stage ... configured to receive a *timing signal* indicating the on and off periods of the switched current, wherein during an off period of the switch, the offset stage is ... configured to generate an auxiliary signal such that the *sum* of (i) the intermediate measuring signal during the off period and (ii) the auxiliary signal generated during the off period is equal to zero [ ... and ... ] wherein during an on period of the switch, the offset stage is ... configured to sum (i) the intermediate measuring signal ***during the on period*** and (ii) the auxiliary signal *that was generated during the off period* ... and ... *provide the sum signal from the off period and from the on period as the measuring signal, the measuring signal reflecting an actual value of the AC part and a DC part of the switched current*" [emphasis added] as specified above and as claimed in claim 4.

Thus, it is clear that neither patent provides any incentive or motivation supporting the desirability of the combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. § 103 rejection.

In this context, the MPEP further provides at § 2143.01:

*The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.*

In the above context, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination.

In the present case it is clear that the examiner's combination arises solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in either reference for the combination as applied to claim 4. Therefore, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

Accordingly, claim 4 is allowable and an early formal notice thereof is requested. Dependent claims 7-10 depend from and further limit independent claim 4 and therefore is allowable as well. The 35 U.S.C. §103(a) rejection has now been overcome.

By this amendment, claim 11 has been amended in a similar manner as with respect to the amendments to claim 4. Accordingly, claim 11 is believed allowable for at least the same reasons as those presented herein above with respect to overcoming the rejection of claim 4. The 35 U.S.C. § 103(a) rejection thereof has now been overcome. Dependent claims 12-14 depend from and further limit independent claim 11 and therefore is allowable as well. The 35 U.S.C. §103(a) rejection has now been overcome.

Claims 5 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Lethellier** and **Schetelig** in view of **Neft** and further in view of **Akamatsu et al.** (USPAT 4,298,838). With respect to claims 5 and 6, Applicant respectfully traverses this rejection for at least the following reason. Claims 5 and 6 depend from and further limit independent claim 4 and therefore are allowable as well. The 35 U.S.C. §103(a) rejection has now been overcome.

Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over **Lethellier** and **Schetelig** in view of **Neft** and further in view of **Kushida et al.** (US 2002/0185987). With respect to claim 12, Applicant respectfully traverses this rejection for at least the following reason. Claim 12 depends from and further limits independent claim 11 and therefore is allowable as well. The 35 U.S.C. §103(a) rejection has now been overcome.

### **Conclusion**

Except as indicated herein, the claims were not amended in order to address issues of patentability and Applicants respectfully reserve all rights they may have under the Doctrine of Equivalents. Applicants furthermore reserve their right to reintroduce subject matter deleted herein at a later time during the prosecution of this application or a continuation application.

It is clear from all of the foregoing that independent claims 1, 3, 4 and 11 are in condition for allowance. Dependent claims (2), (5-10), and (12-14) depend from and further limit independent claims 1, 4, and 11, respectively, and therefore are allowable as well.

The amendments herein are fully supported by the original specification and drawings; therefore, no new matter is introduced. Withdrawal of the Final Action and an early formal notice of allowance of claims 1-14 is requested.

Respectfully submitted,



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Dated: 8/31/08

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